WHAT IS CLAIMED IS:

1. A passive sensing system for determining a physical position of a mechanical device, comprising:

an encoding system configured to convert a position signal representative of the physical position of the mechanical device into an encoded signal in a binary format;

a plurality of secondary optical paths coupled to a primary optical path, each of the primary optical path and the secondary optical paths positioned between a light source and the encoding system;

wherein the encoded signal comprises a plurality of pulses of light each sequentially delayed by the secondary optical paths.

2. The system of Claim 2 wherein the primary optical path comprises a single fiber optic cable and the plurality of secondary optical paths comprise a plurality of fiber optic cables.

3. The system of Claim 2 wherein the encoding system is configured to convert the pulses of light into a representation of a binary number.

4. The system of Claim 3 wherein the encoding system comprises a plurality of reflectors.

5. The system of Claim 4 further comprising a control system configured for reading the encoded signal.

6. The system of Claim 5 wherein the control system comprises an application specific integrated circuit.

7. The system of Claim 5 wherein the control system further comprises a photodetector.

8. The system of Claim 7 wherein the light source comprises at least one of a light emitting diode and a laser diode.

9. The system of Claim 8 wherein the light source is configured to provide to the encoding system an input signal through the plurality of fiber optic cables.

10. The system of Claim 9 wherein the encoding system is configured to provide to the control system the encoded signal through the plurality of fiber optic cables.

11. The system of Claim 10 wherein the input signal is provided through the plurality of fiber optic cables in a first direction and the encoded signal is provided through the plurality of fiber optic cables in a second direction.

12. The system of Claim 11 wherein the first direction is in a direction opposite of the second direction.

13. The system of Claim 4 wherein the plurality of fiber optic cables engage the single fiber optic cable having a diameter greater than a diameter of each of the plurality of fiber optic cables.

14. The system of Claim 13 wherein the plurality of fiber optic cables abut against the single fiber optic cable at an interface.

15. The system of Claim 13 wherein the single fiber optic cable has a length of less than about 100 meters.

16. The system of Claim 13 wherein a majority of the plurality of fiber optic cables each have a different length.

17. The system of Claim 13 wherein the length of each of the plurality of fiber optic cables corresponds to a retention of the pulses of light in each of the plurality of fiber optic cables.

18. The system of Claim 14 wherein the encoded signal is sampled at a rate of less than about 2 nanoseconds.

19. A system for determining a physical position of a flight control surface of an aircraft, comprising:

means for transmitting an incident pulse of light;

means for dividing the incident pulse of light into a plurality of incident pulses of light;

means for reflecting the incident pulses of light and for providing a plurality of reflected pulses of light;

means for delaying the incident pulses of light and for delaying the reflected pulses of light;

means for detecting the reflected pulses of light;

wherein a signal encoded in a binary format and representative of the physical position of the flight control surface is provided to the means for detecting the reflected pulses of light.

20. The system of Claim 19 wherein the means for transmitting the incident pulse of light comprises at least one of a light emitting diode and a laser diode.

21. The system of Claim 20 wherein the means for detecting the reflected pulses of light comprises a photodetector.

22. The system of Claim 21 wherein the means for delaying the incident pulses of light comprises a plurality of fiber optic cables.

23. The system of Claim 22 wherein the means for reflecting the incident pulses of light comprises a reflector.

24. The system of Claim 23 wherein the reflector has a physical position corresponding to the physical position of the flight control surface.

25. The system of Claim 24 wherein the means for dividing the incident pulse of light into the plurality of incident pulses of light comprises a plurality of fiber optic cables in communication with a single fiber optic cable.

26. A method for determining a physical position of a flight control surface of an aircraft, comprising:

transmitting an incident pulse of light from a light source through a primary optical path and subsequently dividing the incident pulse of light into a plurality of incident pulses of light;

transmitting the incident pulses of light through a plurality of secondary optical paths;

reflecting the incident pulses of light with a reflector;

transmitting the reflected pulses of light through the secondary optical paths and subsequently transmitting the reflected pulses of light through the primary optical path;

detecting the reflected pulses of light with a control system having a photodetector;

wherein an encoded signal representative of the physical position of the flight control surface is read by the control system.

27. The method of Claim 26 wherein reflecting the incident pulses of light further comprises reflecting the incident pulses of light with a reflector having a physical position corresponding to the physical position of the flight control surface.

28. The method of Claim 27 further comprising encoding the reflected pulses of light into a binary number corresponding to the physical position of the flight control surface.

29. The method of Claim 28 further comprising delaying the incident pulses of light and the reflected pulses of light in a plurality of fiber optic cables.

30. The method of Claim 29 wherein transmitting the incident pulses of light through the secondary optical paths comprises transmitting the incident pulses of light through the plurality of fiber optic cables each having a diameter less than a diameter of a single fiber optic cable of the primary optical path.

31. A passive sensing system for determining a physical position of a flight control surface of an aircraft, comprising:

an encoding system configured to provide a signal encoded in a binary format and representative of the physical position of the flight control surface;

a single fiber optic cable having a first diameter and coupled between a light source and the encoding system;

a plurality of fiber optic cables each having a second diameter less than the first diameter and configured for coupling to an end of the single fiber optic cable;

wherein an illumination pulse from the light source is divided into a plurality of pulses by the plurality of fiber optic cables.

32. The system of Claim 31 wherein the illumination pulse comprises an incident pulse of light that is undivided in the single fiber optic cable and is divided in the plurality of fiber optic cables.

33. The system of Claim 31 wherein the encoded signal comprises a plurality of pulses of light each delayed in the plurality of fiber optic cables.

34. The system of Claim 33 wherein the plurality of pulses of light are delayed by a loop of the plurality of fiber optic cables.

35. The system of Claim 33 wherein the plurality of pulses of light are serially delayed in the plurality of fiber optic cables.

36. The system of Claim 35 wherein the plurality of pulses of light are delayed by less than about 4 nanoseconds.

37. The system of Claim 35 wherein the plurality of fiber optic cables abut against the single fiber optic cable.